Using Magnetic and para magnetic micro particles (Chemical) During EMH (Electro Magnetic Heating) for Thermally EOR (Enhanced Oil Recovery) of West-Siberian Heavy Oil.

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Abstract:

This investigation was conducted to determine the effectiveness of using magnetic and para magnetic micro particles and electromagnetic heating during Enhanced oil recovery (EOR).

Bitumen and Residual oil was used to simulate heavy oil conditions. Heat production was estimated using Specific Absorption Rate(SAR) calculation based on the measured temperature-time profile and mass of fluid micro particle mixture.

A total of three different types of magnetic micro particles were prepared for testing. Ferrite based micro particles have been reported in literature as hyperthermia agents. In this study, the effect of Ni ,Fe and Al on the hyperthermia characteristics of ferrites was investigated.

Also effect of EMH and different Micro particles composition, with and without water on viscosity of heavy oil and recovery in experimental test and modelling in multiphysics software (COMSOL) are investigated .

Equipment which used during the tests are Infrared Spectrometry , Energy Dispersive X-ray Spectroscopy (EDS) For chemical composition, Scanning Electron Microscope (SEM) , X-ray Diffraction (XRD) evaluate the crystallinity of the sample, Mass Spectrometry , Viscometer ,Chromatography and SARA (Saturate, Aromatic ,Resin and Asphaltene)fractionation data and other primary tests.

Electromagnetic heating is an alternative method to heat heavy oil reservoirs without using water or steam. using micro particles to assist the electromagnetic heating presents huge potential. Magnetic micro particles are expected to reduce the energy requirement given their magnetic nature and their small size would allow them to travel to deeper regions beyond well bore locality that are otherwise difficult to reach. Nowadays this method is so useful for thin reservoirs, deep water oil exploitation and EOR and IOR (improving oil recovery) methods.